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H. P. James

PRELIMINARY REPORT

ON THE LANDS

OF THE

NANTAHALA & TUCKASEGE

LAND AND MINERAL

ASSOCIATION.

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By DAVID CHRISTY, Geologist.  
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CINCINNATI:  
WRIGHTSON AND COMPANY, PRINTERS,  
167 Walnut street.  
1856.



*Nantahala and Tuckasege land and mineral  
" company*

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## REPORT.

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MESSRS. GOODHUE, PROBASCO & Co.:

In reporting my labors in the Mineral region of Cherokee, Macon and Jackson counties, North Carolina, to your Association, several topics present themselves for consideration. Your aim, as I understand it, is not only to develop the Mineral resources of the territory purchased; but by the introduction of wool-growing and other pursuits dependent upon pasturage, to turn its surface to profitable account. My attention, therefore, has been called to the following points:

1. The geological and mineralogical character of the country.
2. The probable value of your lands for mining purposes, as inferable from the openings made upon them, and a comparison of their mineral leads with those of Tennessee, where full developments of the mines have been made.
3. The facilities for the transportation of metals and ores to distant markets, when your mines are fully opened.
4. The value of your lands as adapted to pasturage, the growing of wool, and general agricultural purposes.

In presenting the information collected under these heads, they will, as far as practicable, be noticed separately; but it will be necessary also, to some extent, to speak of them collectively.

1. Geological and Mineralogical character of the country.

The rocks of the region under consideration are of the same age, Geologically considered, as those of portions of Tennessee, Kentucky, Ohio, and other Western States; but they have been upturned on their edges, at various angles, by volcanic forces, and re-crystallized by heat. The change thus produced upon them, is designated in Geology by the term *Metamorphic*. It



was during the period in which the rocks of North Carolina were undergoing this change, probably, that the metallic veins were injected into them. Like the rocks of the States referred to, the *Metamorphic Rocks* of Western North Carolina are regularly stratified, and maintain, throughout extensive ranges, great uniformity of structure and mineral composition.

There has been no Geological survey of that part of North Carolina which includes your lands. PROFESSOR SAFFORD has made a survey of that portion of Tennessee which includes its Copper mines, and adjoins Cherokee county, North Carolina, on the west. He was appointed State Geologist, and made his first Report last winter, which has been printed by order of the Legislature. Two additional surveys of the Ducktown region have been made by Professional Geologists, whose Reports have been printed by those interested in the mines.

On commencing my investigations, none of these Reports had come into my possession, and I had to begin my labors unaided by the previous examinations of others. The Geology of the Copper region of Tennessee was first ascertained, and from thence the survey was extended eastward to the region through which the *Charleston and Cincinnati Railroad* is located, and in process of construction. In these explorations I was greatly aided by FELIX AXLEY, Esq., of Murphy, North Carolina, and other intelligent gentlemen of that State, who had previously gone over the ground, and ascertained the points where the minerals at the surface indicate metallic veins beneath.

The metallic veins ascertained to exist in the district named, include *copper ores*, *Lead ore* including *silver*, *Iron ores*, *Black lead*, and *Gold*. *Ochres*, the best of their kind for *Paints*, also exist in one or two places.

The district in which your lands have been purchased, being too distant from any practicable means of transportation, failed to attract attention, and was thus left open for your agent to take the first choice of the mineral lands.

The Geology of the mineral belt is simple and easily comprehended. The Smoky Mountain, on its Northern side, is composed

of sandstones, conglomerates, shales, and slates, alternating with each other, and so far altered by heat as to be called *Semi-Metamorphic*. The strata are tilted up at a high angle, and *dip*, generally, to the South-east. The upturned edges of the rocks are to be seen ranging from North-east to South-west, for hundreds of miles. Veins of *Quartz rock*, from a few inches to more than ten feet in thickness, are protruded through the fissures in these strata, and in many places give a fair yield of Gold. These Quartz veins are not found to be very numerous, in crossing the Northern side of the mineral belt.

To the South of this Semi-Metamorphic range, the *Metamorphic Rocks* occur, and extend to the southern margin of the mineral belt. They consist of *Gneiss*, *Mica Slate*, *Hornblende Slate*, *Talcose Slate*, *Argillaceous Slate*, and *Chloritic Slate*, with their usual variations. These several classes of rocks alternate or intermingle with each other, the separate bands being at times many hundreds of feet in thickness, while at others they measure no more than a few yards. Some ranges of metamorphic limestone, constituting, in places, a very good marble, are included in this portion of this mineral belt. This limestone often includes some lead ore, known to be *argentiferous*, or *silver-bearing*. It has been tested by Prof. C. D. Smith, of Macon county, N. C. The richest gold *placers* in Western North Carolina were found on Valley River, Cherokee county, along one of these ranges of limestone. *Quartz veins*, some of which are barren and others rich in gold, occur in these rocks also; and all the workable copper mines have been found within their range. But the copper mines, mostly, have been found in what are called the *Iron Gossan leads*, and but seldom in the *Quartz leads*.

The Metallic Veins of the region under review, occur among the strata of the rocks described, as engraved plates in a book among the printed leaves. They have not been produced by the causes which formed the rocks, but have been forced into their present position, between the strata, by volcanic action. As the engraving lies between the printed pages, so the metallic veins lie between the strata, "dipping as they dip, and appearing in



outcropping lines along the surface as they do." The origin of these veins having been volcanic, the fissures into which they were injected would be produced in the weaker rocks, or those whose layers would have the least adhesion, and separate most easily. Thus the greater portion of the discovered mines are in *Mica slate*, or *Talcose slate*, which, of all the classes of rocks existing here, would be the most easily fissured by volcanic agencies. Some of the copper mines opened, however, are in the *Gneissoid rocks*.

The metallic veins, though not of very frequent occurrence, in crossing the mineral belt, yet seem to be arranged in groups. At Ducktown, Tennessee, there are at least seven or eight distinct veins of copper, running generally parallel to each other, and limited in their North and South range to a width of about three miles. These metallic veins are usually composed of three distinct portions. The upper part is a mass of light porous *hydrated per oxyd of iron*, to which the miner's term *gossan* is universally applied. This *gossan* is found on the surface at many points along the outcrops of the veins, especially on the knolls and ridges. Sometimes it occurs in great banks or blocks, scattered over a space of fifty or a hundred feet wide, while at others but little of it is to be seen. The depth to which it extends in the vein is variable, being often from seventy to ninety feet on the high grounds, but in the valleys perhaps about twenty-five. The depth appears to be the same as that to which it is necessary to go—in digging wells, for example—to reach water.\*

Immediately below the *gossan* there occurs a bed or mass of dark or *black copper ore*, some of which contains as high as fifty per cent. of metallic copper, but averaging from sixteen to twenty. Its vertical thickness is variable; at some points it swells out in great masses many cubic yards in volume; then again it becomes a thin, irregular layer. The average thickness, perhaps, is between two and three feet. In width, of course, it varies with the veins, which at some points are fifty and sixty feet wide,

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\*Prof. Safford



though the average is much lower. This bed of black copper ore has furnished, as yet, nearly all the ore shipped from the mines in Tennessee,\*

The lowest, or third portion of these veins, is composed of a *compound sulphuret of iron and copper*. The two minerals are commingled in distinct crystals, the sulphuret of iron, however, greatly predominating in the upper portion, while the sulphuret of copper, or the *yellow copper*, as it is called, increases in descending upon the *lode*.† This portion of the vein is continuous downward, and has no termination, probably, except in the great interior source of metallic veins.

Thus, then, these metallic veins are composed of three parts: the *Iron gossan*, the *black copper ore*, and the *compound sulphuret of Iron and Copper*. The last named ores are called, by the miners, the “arsenical iron,” when the sulphuret of iron predominates.

The question very naturally arises, how has this condition of things been produced? In the Reports before me, two attempts are made to solve the question, and the writers agree in opinion.

Says one: “It is quite evident that the whole vein up to the very surface (and far into the air, for it has suffered from the same denudation that has moulded the surrounding country), was originally a compound sulphuret of iron and copper. The rains on the hills finding their way down from the surface through the upper part of the vein, and issuing in springs at water level, have gradually filtered down the copper to water level, and carried off the sulphur, leaving all the upper mass a red oxyd of iron, and underneath it a transverse layer of precipitated black oxyd of copper, below which, the process, of course, could not be carried on, and the vein remains a body of sulphuret of iron and copper.”‡

Another says: “The vein was once undoubtedly filled to the top with this material. [The sulphuret of iron and copper.]

\* Prof. Safford.

† The term *lode* is applied to any regular vein, whether of metals or minerals, or both combined.

‡ Report of J. B. LESLEY, Esq., Topographical Geologist.

The *gossan* and the *black oxyd* have been derived from its decomposition, which has taken place mainly, as we think, through the action of water. The original 'arsenical' ore, in the slow progress of its decomposition downwards, has left behind the resulting light porous *gossan*. The heavier *black oxyd*, on the other hand, in some form or other, has been constantly carried downwards, until it has formed, resting immediately on the undecomposed mass, the bed of black ore as we now find it."\*

Among the specimens which I brought home for your inspection, there are some of the *yellow copper ore*, in which the "arsenical iron" is the exclusive *gangue stone*;"† in others you will notice crystals of *tremolite*, or other earthy minerals allied to *hornblende*, disseminated through the arsenical iron, side by side with the yellow copper ore; while in others still, the arsenical iron is absent, and these earthy minerals, alone, compose the *gangue stone*. Now, wherever a copper vein has but little or none of the arsenical iron associated with its ores, there the explorer for *copper leads* must expect but little or none of the *iron gossan* on the surface, because there has been nothing in the vein from which it could be formed. In such cases, the lead must be traced by other indications, well known to Geologists.

Another remark is needed, in reference to the origin of larger or smaller amounts of *gossan* on the surface. The Ducktown mines do not occur on the mountain ranges, but are in a series of low ridges included in a cove between surrounding mountains. It is the opinion of some, that these hills were once of equal height with the adjacent mountains, but have been reduced by the denuding action of water. It is a general rule, that metallic veins, not affected by chemical action from above, increase in width as they are followed downwards. It would appear from this, that metallic veins, in their protrusion into the strata, have contracted as they approached the surface, and that where denudation has diminished the height of the mountains, the metallic veins must be of greater thickness, than where they maintain their

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\* Report of Prof. SAFFORD.

† The term *gangue rock* is applied to any rock. or one which includes in its mass any valuable metals.



original elevation. The Ducktown mines being on grounds many hundred feet lower than the mountain ranges, will present their veins in as favorable a position, as to thickness, as the mountain leads would show if mined to the depth of one or two thousand feet. As, then, the amount of *gossan* exposed on the surface, must depend upon the thickness of the veins, and the proportion of arsenical iron in them, it will be readily inferred that the *iron gossan* leads, where they pass through the mountains, must necessarily make less show than on the low grounds. With these statements I shall proceed to the second topic to be considered.

2. The probable value of your lands for mining purposes, as inferable from the openings made upon them, and a comparison of their mineral leads with those of Tennessee, where full developments of the mines have been made.

*First.* THE CABE COPPER MINE; This mine was purchased from SAMUEL CABE, and others, for your Association. It is located ten miles south of Franklin, Macon County, near the Tennessee river. It is only about a mile from the Rabun Gap Rail Road, and four miles from the Georgia line. It is opened on an *iron gossan lead*. The copper ore was struck at a depth of thirty feet, and several tons of ore have been thrown up into pile under a shed. It is the *black ore*, intermingled with sulphuret of iron. One specimen, analyzed at the time the mine was opened, I was informed, yielded forty per cent of copper. Another specimen taken from the tunnel near the shaft, by myself, has been analyzed and found equally rich in copper. The thickness of this vein has not yet been ascertained, but it promises to be amply large for profitable mining. The grounds upon which it is opened are of moderate height, and a very large amount of *gossan*, strewn over the surface, indicates a vein of considerable width.

This mine must be viewed as a valuable acquisition not only on account of its favorable location so near the Rail Road, but because of its being so promising as to the width of the *lode*. An

abundance of fuel for smelting can be had from the lands around the mine.

*Second.* THE PATTON MINE. This mine was purchased from the Messrs. Patton, and is located on the branches of Cartoogejayee creek, about four miles south-west of Franklin, and three miles perhaps, in a direct line, from the Rail Road. Its opening was superintended by PROF. C. D. SMITH, an intelligent Geologist, late of Knoxville, Tennessee. The shafts and tunnels had not been touched for six months or more previous to my visit and were so obstructed that it was difficult to see the ore in place. But the specimens of both black and yellow ore, preserved in the collection of PROF. SMITH, on my first visit to his cabinet, six months since, and some which I obtained myself from the mine, on my last visit, show that the *lode* has a fair prospect of being rich in copper. PROF. SMITH, in describing this mine says :

“ The Patton vein is enclosed by Gneiss, the *gangue* of which is principally a *Hornblendic* material with *granulated quartz*. Some of the specimens resemble *green stone* in some of their features. This *gangue* is quite distinct from the strata in which it is enclosed, and has shown itself to be quite an *ore-bearing* material so far as developed. I regret being unable to speak more fully of the width of the *lode*, not having cut through it. It has been penetrated some eight or ten feet by the tunnels; but from the present condition of the works I am unable to furnish you with a suit of the best specimens from this vein. You will find the specimens which I hand you to contain *copper pyrites* and a sort of *gray sulphuret of copper*. While prosecuting the work I also found some pockets of *black oxyd of copper*, all of which have either been carried away or destroyed in the rubbish of the mine.”

*Third.*—THE WALDRUP MINE, lies a mile or two west of the Patton mine. It embraces three hundred acres, and is on the same lead with the Patton mine. The surface testings laid open some Copper ore, but the *lode* has not been cut into at any considerable depth.



*Fourth.*—THE NANTAHALA MINE, was purchased from the MESSRS. PATTON. It lies on the Eastern side of the Nantahala mountain, facing the Rail Road, embraces six hundred and forty acres, shows good surface indications of Copper, but no opening has yet been made upon the tract.

*Fifth.*—THE DYCHE MINERAL LANDS. These lands consist of twenty thousand acres lying westward of the Patton mine, the lead of which runs through one of the tracts embracing five thousand acres. The remaining fifteen thousand acres were entered by Mr. Dyche, on account of the favorable mineral indications they present. Copper has been struck on a tract of land adjoining the first mentioned five thousand acre tract; and a mine has been opened on the Patton lead, on a 160 acre tract of Mrs. Brown, west of the Hiwassee river, which sold, the first of June last, for \$9,400 cash.

*Sixth.*—THE MARR LANDS. These lands were purchased from Wm. Marr, Esq. are in the vicinity of the Dyche lands, embrace twenty-two hundred and eighty acres, and were selected by Mr. Marr, on account of the Patton lead passing through a portion of them, and because of the mineral prospects or agricultural value of the remaining portion.

*Seventh.*—THE DAVIS AND GHORMLEY LANDS. These lands embrace twenty four thousand three hundred and twenty acres. They are located in Macon and Jackson counties North Carolina, on the North side of the Tuckasege river, and commence within a few miles of the Rabun Gap Rail Road, from whence they extend eastward along the leads of the *Iron Gossan* and of *Quartz* existing in that neighborhood. These lands were located by Dr. Davis, after examining the Ducktown mines, and the whole intermediate country. They are supposed to be on the Ducktown leads, and include the tracts pointed out to Mr. AXLEY, by Mr. FABER, a Geologist of New York, as the most promising Copper lands in North Carolina. No testing has yet been done upon them. This body of lands will be intersected by the North Carolina Central Rail Road, which is projected to extend down the Tuckasege river, to intersect the Charleston and Cincinnati R. R.

*Eighth.*—THE DELOZIER LANDS.—These lands embrace six thousand seven hundred and twenty-acres, and are in Cherokee county, North Carolina. They have been purchased from Delozier and others. One of the tracts, embracing 640 acres, is directly on the Rabun Gap Railroad, the width of the Little Tennessee, only, separating it from the track of the road. The remaining tracts are a little to the Westward, but on the same mineral lead. The first named tract is about three-fourths of a mile below the mouth of the Tuckasege river. John Caldwell, Esq., who has been so fortunate in his testings at Ducktown, examined this tract a year or two since, and, upon digging a few feet below the surface, in the bed of a small stream, he found mineral substances, which he pronounced *copper ores*. The place had been filled up by the floods, and I had no time for re-opening it.

The broad band of Talcose slates, on which these lands are located, extends for a great distance in a line parallel with the Smoky Mountain, but some fifteen to twenty miles South of the center of that mountain range. Its lands have been held in high repute, by explorers for mineral wealth, and none of it now remains vacant. The slate is hard to penetrate, no science has yet been applied to testing it, and but little success has attended the labor of explorers. But I have been informed, by reliable authorities, that *copper ores*, and some *silver* combined with *lead ore*, have been discovered in this range of Talcose slates. It is very certain that the *iron gossan* and *Quartz leads*, extending throughout its range, have not been fairly tested. Some of the parties interested at Ducktown have purchased a considerable amount of lands upon these leads.

*Ninth.*—Negotiations are in progress for the acquisition of two mines of *black lead*, one of which, from the specimens supplied, seems to be of very fine quality, and the other of a character likely to be in extensive demand by foundry men.

The similarity of the mineral leads throughout your lands to those of Tennessee, adjoining, making proper allowance for the



greater elevation of the country, leaves no doubt upon the minds of those who have made the examination, that there can be but little difference in the mineral productiveness of the two districts. So fully impressed were some of the leading operators of Ducktown with the truth of this view, that they, some months since, proceeded to purchase 10,000 acres of land to the North-east of the Patton mine. At both points the *lodes* are found to be richer in yellow copper ore, near the surface, than at Ducktown. The Cabe mine seems to be identical in the character of its ores with the Ducktown mines.

There were doubts at one time, when the supplies of black ore were found to be limited, whether the mines of Ducktown would be permanent. This question could only be settled by testing the lower portion of the *lode* for yellow ore. This was undertaken by the Hiwassee Company, and a shaft has been sunk so as to cut the lode at the depth of seven hundred feet. The work is superintended by CAPT. HARRIS, an intelligent English gentleman, familiar with mining. At the depth of one hundred and forty feet, an adit was run out from the shaft to the lode, the results of which he reports thus: "The farther I get into the lode, the better it proves to be. I am at present five feet in the lode; if it continues to improve, it will surpass any thing I ever saw." Again, at a later date, he says: "The vein has been intersected by a cross-cut sixty feet lower, being two hundred feet from the surface. At this depth it has *greatly improved*. Masses of fine yellow sulphuret of copper occur in abundance. This is considered as settling the value of the mines."

A word as to the productiveness of the Ducktown copper mines. The first mine was discovered in 1850, and no shipments of ores, on a large scale, could then be made, nor until long afterwards, for want of roads. Even at present it is forty-three miles to Cleveland, on the East Tennessee Railroad, the nearest point at which railroad transportation can be reached. The earlier shipments had to be made to Dalton, Georgia, a distance of seventy-four miles. Notwithstanding these inconveniences, there had been 14,291 tons of copper ores shipped from the

Ducktown mines, before the close of 1855, which was sold for more than a million of dollars.

To enable you to judge of the productive capacity of these mines, it need only be said, that, in the month of September, 1855, *seven mines* produced a little more than 807½ tons of ore, the value of which was about \$80,000, or at the rate of nearly a million of dollars per annum.\*

It may here be explained, that the copper mines of Tennessee and North Carolina, including those belonging to your Association, differ very essentially from those of the Lake Superior region. The copper veins of Lake Superior contain, often, a very large proportion of *native copper*, which can not be removed from the mines by drilling and blasting. A charge of powder, instead of fracturing the native copper in which it is inserted, merely shoots out the *tamping*, as the wadding is shot from an ordinary brass cannon, or the ball from a Sharpe's rifle. The slow process of cutting it up by the *chisel* is the only remedy. On the contrary, the Tennessee and North Carolina copper veins contain nothing but *brittle ores*, which are as easily fractured as common limestone, and a miner can throw out as many perch of it in a day as he could of ordinary limestone rock, excepting that the drilling, at times, may be more tedious.

I have not at hand the means of contrasting the relative productiveness of the Tennessee and Lake Superior copper mines: but the Railroad Record of January 31, 1856, has the following statement, which, from the known accuracy of Prof. MANSFIELD, its editor, may be taken as a close approximation to the facts in the case. It presents the Tennessee mines in a very encouraging attitude, notwithstanding that they have not been opened half so many years as those of the Superior region. This may be accounted for, however, by the fact, that the intensity of the cold of winter renders the latter mines inaccessible for more than six months in the year, while the labor at the former need not be remitted, on account of cold, for a single day.

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\* Geological Report of Tennessee.



“It is a singular fact, that while the New York and Boston owners of copper mines, on Lake Superior, have been filling the world with their renown; while, we say, this has been going on at the North, the copper mines of East Tennessee have been producing *three-fold* as much copper! We find, in the Lake papers, that the amount of copper produced on Lake Superior last year, and exported, was about 4,800 tons, while that produced in East Tennessee was 14,191 tons. \* \* \*

“Our imports of copper (deducting exports), amount to about \$3,000,000, of which two-thirds are from Chili, imported in pigs and ore. It would seem that there are no manufacturing establishments for copper in Chili, or we should not import it in the raw state.

“As we now mine (in this country), two-thirds the copper we consume, as there are many new mines, and the product constantly increasing, it is very obvious we shall soon *export* copper to Europe. In fact, copper will probably be the first *metal* in which we shall show a superiority over the rest of the world.

“The copper mines of the United States are entirely inexhaustible, and some of them rich, beyond anything known in other countries. Mines were formerly worked in New England, which are about to be revived. \* \* \*

“Since we wrote the above item, it has occurred to us, that the Lake Superior copper ore, sent to the East, may be in a more pure state, and thus account for the difference. We find that the copper ore sent out, by the Cliff mine, yielded 47 per cent.; that by the Tennessee companies, about 24 (see *Mining Journal*, Feb., 1855), and at this rate, the difference would be thus:

Lake Superior,.....	5,000 tons produced	2,350 tons
Tennessee and Georgia.....	14,000 “ “	3,360 “

So that the amount of *pure* copper now mined, in the Tennessee region, is yet much greater than that on Lake Superior.”

A word, also, as to the value of copper lands at Ducktown. The Hiwassee Company, at its organization, purchased 500 acres of land, for which, including the rights of third parties to the adit, shafts, drifts, etc., they paid \$220,000; and, recently, another tract of 160 acres, with a mine fully developed, was sold for \$460,000.

The cost of opening mines on your lands may be inferred from the fact stated in one of the Reports referred to. The actual cost

of raising 447 tons of ore, with the cost of shafts, driving drifts, and other work preparatory to taking out the ore, with all labor at the mines, amounted to only \$2,011, independent of salaries.

3. The facilities for the transportation of metals and ores to distant markets, when your mines are fully opened.

The inquiries into this point have been carefully made, and the information derived from official sources. The Charleston and Knoxville Railroad, when finished, will pass through the immediate vicinity of your lands, and afford a direct means of communication with the sea-board. The North Carolina Central Railroad, in its extension Westward, will also intersect a large body of them. To understand, fairly, the prospects of your being able to ship the ores of your mines to market, the history and present condition of the first named road must be stated :

This railroad has been finished from Charleston, South Carolina, as far as Anderson, in that State. The Blue Ridge Railroad Company, covering the distance between Anderson and the Georgia line, was chartered by the Legislature of South Carolina, December, 1852. The State at that time refused to subscribe to the funds of the Company, but agreed to indorse its bonds to the amount of \$1,250,000. The city of Charleston, at the same time, subscribed \$1,049,000. In July, 1853, a contract was entered into with A. BANGS & Co., of New York, for the construction of the whole road from Anderson, S. C., to Knoxville, Tennessee, a distance of 196 miles. Work was commenced November, 1853, and the road to be finished in three and a half years.

In December, 1854, the State amended the act, granting aid, by subscribing \$1,000,000, and reducing the State indorsement of the bonds of the Company to \$1,000,000. These sums, added to the subscription of Charleston city, gave the Company available cash to the amount of \$3,000,000.

On February 1, 1856, the Company notified BANGS & Co., that if sufficient force was not placed upon the tunnels and masonry, by the first of April, to finish the road by the time named



in the contract, they would declare it void, and undertake the work themselves. No improvement being made on the first of April, the Company assumed the work, and made contracts on very favorable terms, with reliable and competent men, at a considerable saving on the prices of Bangs & Co.

The grading in South Carolina, 50 miles, is nearly finished; and, but for the want of bridges, the track could be laid for 35 miles, to Walhalla, this year. Temporary *Tressel* work will be erected over two of these streams immediately, and the iron will be laid six miles from Anderson this year, and to Pendleton, 14 miles, early next year.

In Georgia the whole work is under contract, and progressing. The work in Tennessee is also let, and progressing vigorously. The State of Tennessee has appropriated \$10,000 per mile to this railroad, so far as it extends within her own limits. The cash means of the Company are \$4,250,000, and it is authorized to issue \$1,500,000 in bonds. These amounts will be increased by the sums paid to contractors, in stocks and bonds. On the 4th September last, the city of Knoxville subscribed an additional \$50,000, which secures the completion of the road to the Kentucky line.

The principal tunnel, at the Stump House mountain, in South Carolina, will offer no great obstacle to the progress of the work. The rock through which it is being cut is *Gneiss*, as Geologists term the stratified crystalline rocks destitute of organic remains. It is not in a decomposing state, but compact and hard, and no arching will be required. The excavation is progressing at the rate of two feet per day, when all things are in proper order; and when the shafts are sunk to grade, there will be ten faces to work upon.

As this road passes through portions of four different States, as many separate charters and organizations were necessary to the prosecution of the work. The charters, however, were drawn up with the view of consolidating the Directory under one head. The Blue Ridge Railroad Company, in South Carolina, is now

constituted the active Agent of the whole of the Companies ; and the work is thus under the control of its efficient President, JUDGE FROST, and its able Chief Engineer, COL. GWYNNE.

The distances are as follows : From Anderson to the Georgia line,  $50\frac{1}{2}$  miles : thence to the North Carolina line,  $17\frac{1}{2}$  miles ; thence to the Tennessee line, 74 miles ; and thence to Knoxville, 54 miles. Total, 196 miles.

The work on this railroad is now progressing vigorously. The city of Charleston stands pledged to its completion, as her only practicable outlet to the North-west. The contracts for the completion of the heavy fills and tunnels are limited to four years and a half, from first of April last. The minor jobs will be completed before that period, so that there will be no delay in putting on the rolling stock.

But while over four years must elapse before the railroad is completed through North Carolina, it will be finished to the Stump House mountain in two years from last July. This point being distant from your Cabe Mine only thirty-five miles, you can then commence the transportation of ores, as there is a good wagon road the whole distance.

It is but justice to say, in this connection, that the Rabun Gap Railroad owes its existence to the intelligent exertions of COL. WM. H. THOMAS, of North Carolina ; and that he is now devoting himself with equal ardor to the extension of the North Carolina Central Railroad, so as to secure a connection between Beaufort, on the Atlantic, and Memphis, on the Mississippi. As success has crowned his efforts in the first case, so we feel confident he will be equally successful in the last. Arrangements had been made for a preliminary survey of the route by Col. Gwynne, through the counties of Jackson, Macon, and Cherokee, in North Carolina, to Ducktown, in Tennessee. This examination was made during the summer, and the Report will be prepared before the meeting of the next Legislature.

The Rabun Gap and Knoxville Railroad is located along the valley of the Little Tennessee, and passes within one mile of your Cabe mine, and within about three miles of the Patton mine,



on Cartoogejayee Creek. It also passes alongside of some of your other mineral lands, as before stated, the river only separating the road from the line of the lands. All the lands obtained on the West side of the river are within a reasonable distance of the road, so as to add no very great expense in the transportation of metals and ores.

The North Carolina Central Railroad is to pass down the Tuckasege river, and will intersect the lands purchased on the East side of the Tennessee river. It is thus rendered certain, that, at no very distant day, the products of the whole of your mineral lands will be rendered accessible to market by railroad transportation; so that in *twelve hours from the time the cars start from your mines, the ores can be landed on the sea-board.*

4. The value of your lands as adapted to Pasturage and the growing of Wool, and Agricultural purposes.

To understand the agricultural value of your lands, a few remarks are needed. Soils, it is well understood, are derived from the decomposition of rocks; and the combination therewith of decomposing vegetable and animal substances renders them fertile. Some soils are produced from rocks *in place*, while others are derived from rocky materials *transported* from other points by currents of water or the action of ice-bergs, as in the case in districts covered by *Diluvium* or *Alluvium*. There are no such deposits in Western North Carolina, as diluvial or alluvial, excepting along the courses of the rivers. The soils of its uplands, therefore, must have been derived from the rocks upon which they are based, except where the superior portions of the mountains differ Geologically from the inferior and have sent down, by the rain currents, a portion of their decomposing materials to mingle their elements with those of a dissimilar character below. The Geologist, then, by examining the ranges of these Metamorphic Rocks at one point, can without the labor of visiting them, decide with great certainty as to the quality of their soils at other points. He knows that the only material difference which can exist in the soils at any two points, along the same strata of rocks, will depend, not upon differences in the

*inorganic* elements composing them, but in the greater or less depth to which they have accumulated, and the amount of *organic*\* elements intermingled therein from the decomposition of vegetation. This rule has some exceptions, but they need not be noticed here. None of the lands purchased are situated on Geological ranges of rocks that were not examined at many points. There are none of them but will afford good soils for pasturage; while there are coves and other portions of many of the tracts which are adapted to tillage. But it will be best to proceed more systematically.

From experiments made, it has been determined that the mountain lands of Cherokee, Macon and Jackson Counties, North Carolina, within which your lands are located, are well adapted to the growth of the tame grasses and clover, and are admirably adapted to pasturage, either for sheep, mules or cattle, but especially for the former.

But to say that the soil and climate of Western North Carolina are better adapted to the raising of sheep than of other animals, is to state only half the truth. North Carolina can be made to compete successfully, in wool growing, with the world at large. The altitude of the country, the purity of its atmosphere, the mildness of its climate, the abundance of its never-failing springs of pure water, its freedom from all malarious influences, its unvarying healthfulness, all combine to make it the most attractive point of immigration in the Union; and when once it is generally known that it presents the most inviting field for the production of Wool, one of the great staples of the country, the wool-growers will not fail to accept the advantages it offers.

It is no exaggeration to say, that Western North Carolina can be made to compete with the world, in the production of the finest qualities of Wool. There can be no appreciable difference, as to climate and other conditions, between it and Tennessee,

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\* The *inorganic* elements of rocks and soils are potash, soda, lime, magnesia, manganese, iron silica, and alumina.

The *organic* elements essential to vegetation, are oxygen, hydrogen, nitrogen and carbon.



which has already competed with the world, for the Golden Fleece, and won the prize.

MARK R. COCKERELL Esq., an extensive Wool-grower of Tennessee, attended the World's Fair in London, in 1851 and presented some of his wool in competition with the wools of Europe. The contest under, the rules, was between countries, not individuals. The premium of the "Golden Fleece" was awarded to Tennessee, and MR. COCKERELL bore the pleasing intelligence home to his fellow-citizens. The Legislature of that State, the winter following, passed a resolution tendering Mr. C. its thanks, and ordering the preparation of a gold medal to be given him as a token of their respect.

On its presentation, among other things he said ;

"Germany, Spain, Saxony, and Silicia were there ; the competition was honorable, strong, and fair. Nature gave me the advantage in climate, but the noble Lords and worthy Princes of Europe did not know it, until we met in the Crystal Palace of London, before a million of spectators. While their flocks were housed six months in the year, to shelter them from the snow of a high latitude, and were fed from the granaries and stock yards, mine were roaming over the green pastures of Tennessee, warmed by the genial influence of a southern sun,—the fleece thus softened and rendered oily by the warmth and green food, producing a fine even fibre."

But to return to the lands of North Carolina. The general bearing of the mountain ranges is from N. E. to S. W. A large proportion of the lands are thus found facing the South. This exposure to the sun serves speedily to melt off the occasional snows which fall during the winter ; and I am assured that it is very rare for snow, on these inclinations, to remain more than thirty-six or forty-eight hours at one time. As *blue grass* and *white clover* remain green and fresh the year round, their substitution for the native grasses would secure the best of sheep pasture through the winter, and but little grain would be needed by the shepherd for the support of his flocks.

Nor will there be much waste lands in these mountains. The surface of the country, generally, is smooth, the rocky precipices being limited mainly to the courses of the rivers. A rich carpet of native plants and grasses, in spring and summer, everywhere covers the woodlands, affording ample pastures for flocks and herds. But these wild pastures, in autumn and winter, grow harsh and dry, and are of little value as food for stock. Besides, as the country is settling up, and domestic animals multiply, this pasturage wears out, to some extent, and is insufficient for the support of the stock of the settlers. The substitution of blue grass and white clover will remedy this defect. This change, with the aid of a little capital, may be easily effected. The practice prevails of burning the fallen leaves from the ground every spring, to destroy the underbrush, and promote the growth of the native pasturage. But these burnings have done more than merely to keep down the growth of tangled forests, that the cattle may have ample pastures. They serve to keep the woodlands in a constant state of preparation for the introduction of the tame grasses among the forest trees, as is the custom in Kentucky, and will supersede the necessity of clearing up the grounds preparatory to the establishment of sheep farms.

Wool growers, then, we repeat, must be attracted to North Carolina as soon as they come to a knowledge of the advantages to be gained in that region. It will cost no more to purchase lands there than elsewhere, and it will cost two-thirds less to *feed*, the year round there, than it does in Vermont or Pennsylvania, and the wool will be more valuable when clipt.

The burning of the fallen leaves, alluded to above, does no material injury to the forest trees, but leaves them, generally, to continue their growth. The size of the trees is about equal to that of those on similar Geological formations in Kentucky and Ohio—in some places low, in others lofty. In the coves of the mountains, however, there are trees of equal size with those produced by the best lands at the North. Take the following measurements, in Tuskegee Cove, near the Little Tennessee River, in Cherokee county, North Carolina, as examples—the line being stretched around them about four feet above the ground :



Black Locust, in circumference, feet,.....	6½
Buckeye,.....“.....“.....	12
Shell-bark hickory,...“.....“.....	9
Sugar maple, .....“.....“.....	8
White maple,.....“.....“.....	7½
Chestnut, .....“.....“.....	19¾
Yellow poplar,.....“.....“.....	18½
Black oak,.....“.....“.....	10
Beech, .....“.....“.....	11

In other localities the wild cherry, black walnut, and the several varieties of hickory and oak, attain a size about equal to these. In many of the coves, as well as in the less exposed situations on the mountain sides, where the trees are shielded from the winds, they often grow up as straight as arrows, and may yet supply a large amount of *ship timber* to the Southern sea-board, when the completion of the Railroads to the North-west, shall have stimulated commercial enterprise in our Southern cities. The very last conversation I had with that eminent philosopher, Dr. JOHN LOCKE, just before he was taken from us, was on this subject. Taking into view the fact that the forests have mostly been cleared away on the south of the Blue Ridge, and that trees suitable for ships are only produced by the growth of hundreds of years, he expressed the opinion, that the timber of the mountains, along the line of the Rabun Gap Railroad, would not only be in demand for lumber to supply ordinary purposes at the South, but that it must ere long become indispensable to its supply of *ship timber*.

But the slopes and coves of the mountains of North Carolina will be used for other purposes than pasturage and as resorts for ship timber. Portions of them, adapted to the purpose, by presenting a southern exposure, will be devoted to the cultivation of the *Grape*. Many of the coves, in the midst of the mountains, are admirably adapted to this purpose. North Carolina gave to the country the far-famed *Catawba Grape*, which now enriches, by its luscious clusters, the vine-dressers of Cincinnati. Why should she not enrich herself by the extensive cultivation of the vine, which her own soil spontaneously produced?

The Northern sides of these mountains have also their economical value, besides being the producers of the loftiest timber. They will not only supply the richest summer and autumn pas-

tures, when sown in blue grass and white clover, but will yield an abundance of hay for winter feeding, when set with red clover, herd grass, and timothy.

The Peach and the Apple, too, will rarely fail to yield their fruits in abundance, when planted on the northern sides of the mountains. Held back in their development of buds and blossoms in the spring, by the chilliness of their position, the fruit will rarely be sufficiently advanced to be injured by the later frosts. Apples and Peaches both are cultivated in a small way here, and are unsurpassed for delicacy of flavor by those of any other section of the country. On the completion of the Cincinnati and Charleston Railroad, the fruits of North Carolina's mountains will doubtless compete, in the Cincinnati markets with that of our own enterprising Orchardists. Or, to guard against failures in the future, why should not the fruit-growers of Cincinnati double their chances by having orchards in North Carolina, as well as in Ohio? The fruit crops, I was assured, in many places, do not fail more than once in four or five years.

The duration of the winters, in North Carolina, usually, have a range of about three months. Plowing, by the best of farmers, is mostly done, for the spring crops, in the month of February. March, generally, is too stormy, and the weather too uncertain, for out-door's labor.

In conclusion, I must direct your attention to another very important consideration. The country heretofore has been almost inaccessible for the want of Railroads. The two already mentioned will develope it rapidly. Its mineral resources are immense, and wherever great copper mines are developed and in operation, a large population will be attracted.

The stimulus given to the agricultural and mineral interests must build up considerable towns and villages, to accommodate the mining and agricultural population, Your lands are so situated with regard to other towns and the railroads, that towns must grow upon them whenever the mines are opened, and it would be well to select the sites convenient to such mines, and lay off towns for the convenience of the people who will emigrate there.

DAVID CHRISTY.

Nov. 17, 1856.





